# FSBGD Occlusion Review

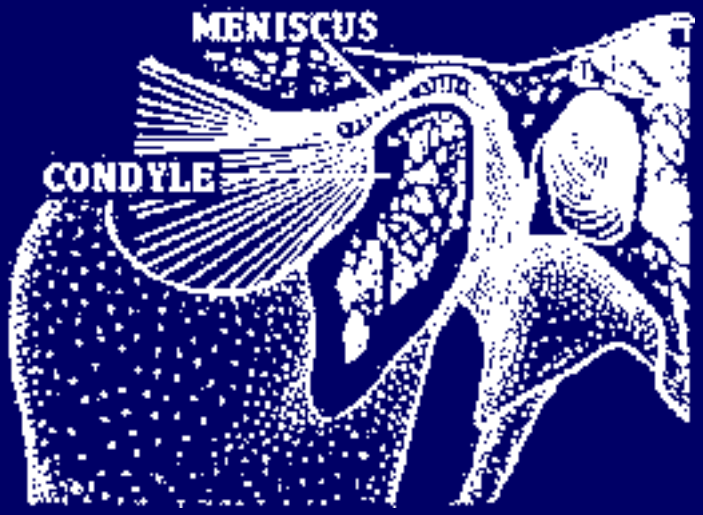
"What, me study?"

CAPT Dave Cote, DC, USN

**If you walk the walk, you've got to talk the talk.**

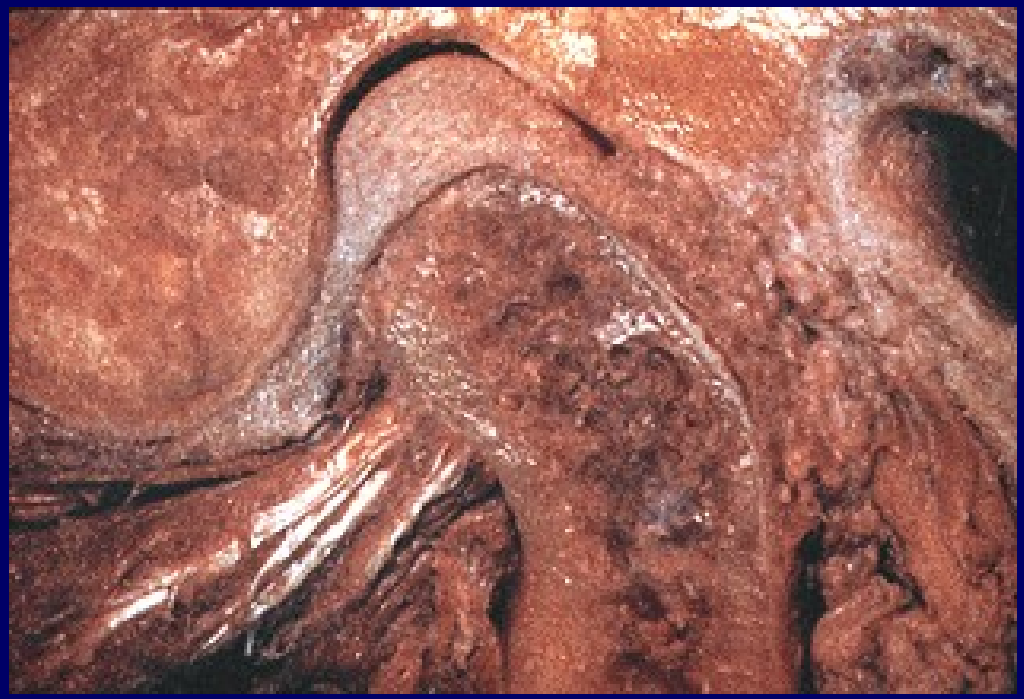
# Centric Relation-

A maxillomandibular relationship in which the condyles articulate with the *thinnest avascular portion of their respective disks* with the complex in the *anterior-superior position* against the *slopes of the articular eminences, independent of tooth contacts.*



# Centric Relation

This position is clinically discernable when the mandible is directed superiorly and anteriorly and restricted to a *purely rotary movement about a transverse horizontal axis*.



# Maximum Intercuspation

Maximum occlusal inter-arch contact *irrespective of condylar position*. This type of contact may or may not occur on the path of the centric relation closure. When centric occlusion does not occur in the centric relation contact position, the external pterygoid plays an active role in positioning the condyle for clenching. Syn: Acquired Centric, Habitual Centric, Intercuspation

# Centric Occlusion

The occlusion with opposing teeth when the mandible is in centric relation. *May or may not coincide with MI*.

# Mandibular Lateral Translation

The translatory portion of lateral excursions. This movement can occur in an essentially pure translatory form in the early part of the motion or in combination with rotation in the latter part of the motion, or both. It is described by three components- *amount, direction and timing*.

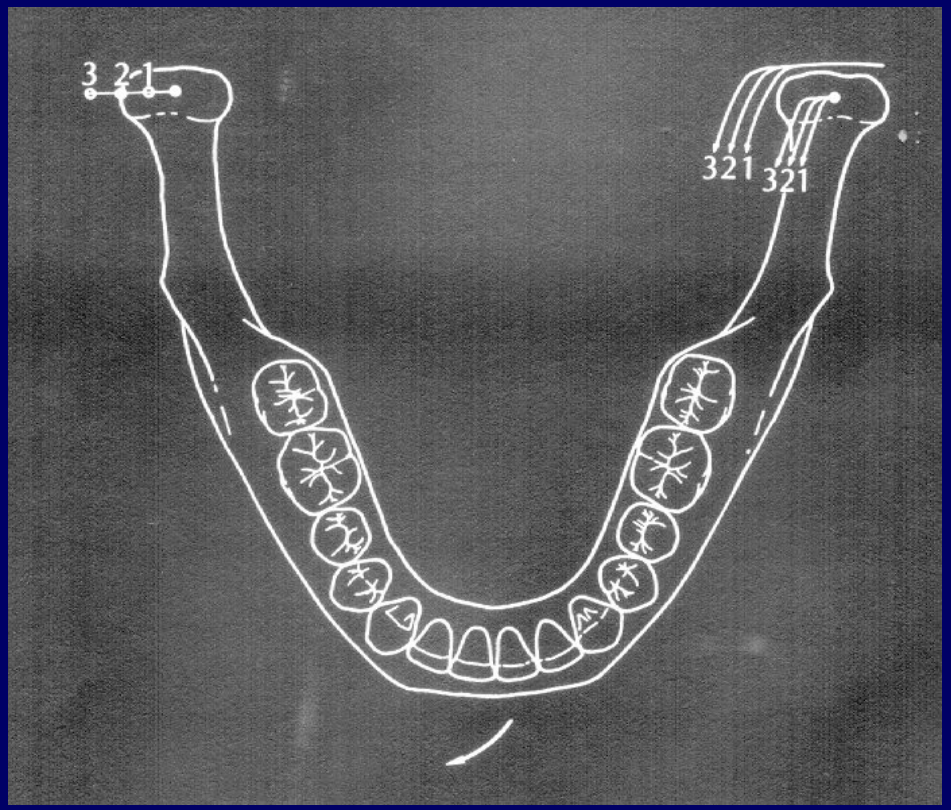
# Mandibular Lateral Translation

In visualizing this movement, one must remember that the condyle is essentially ovoid, not spherical, and that during lateral excursions, *the irregularly shaped condyle rotates simultaneously about three axes.* Moving the vertical axis of rotation may have a pronounced effect on the path traced by mandibular cusps against the maxillary teeth. *Mandibular lateral translation can only be approximated or averaged on a semi-adjustable articulator*.

# Mandibular Lateral Translation

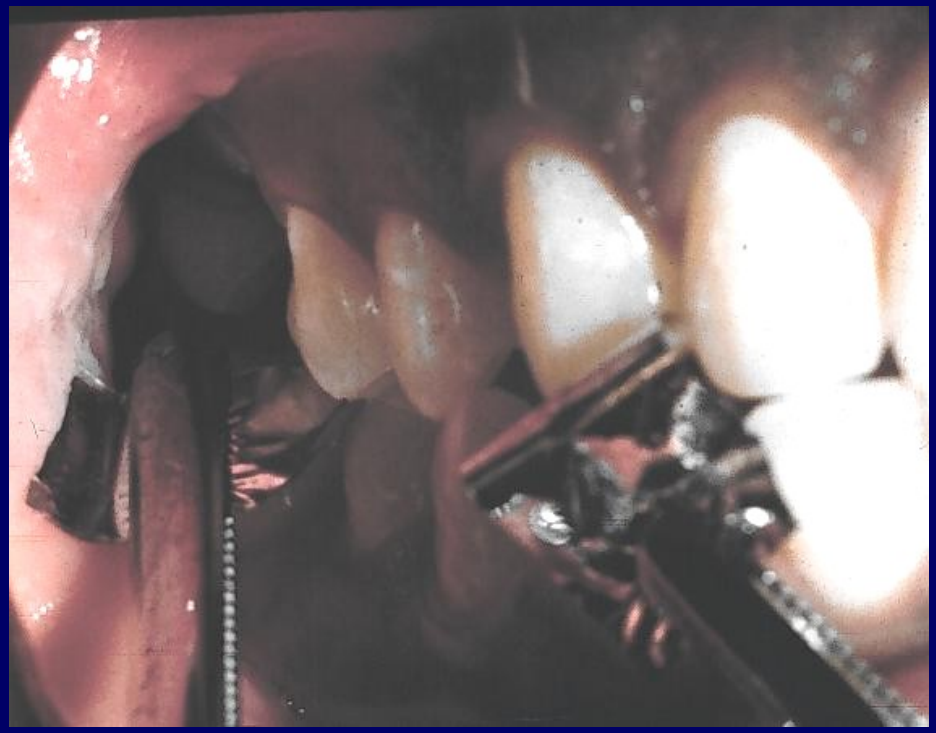
- **Immediate M.L.T.** - The translatory portion of lateral excursions in which the non-working condyle moves essentially straight medially as it leaves centric relation. Dawson argues against the existence of Immediate M.L.T. in the absence of frank pathology.

- **Progressive M.L.T.** - The translatory portion of lateral excursions that occurs at a rate or amount directly proportional to the forward



# Occlusal Contact

Any meeting or touching of tooth surfaces. Unmodified, the word “contact” *should imply a normal, non-pathologic touching of tooth surfaces*.



# Occlusal Contact

Harmful occlusal contacts may be generally categorized as either, 1) *Parafunctiona*l (non-masticatory) *contacts*, which are normal tooth contacts that have been subjected to excessive use through bruxism, clenching, etc., or 2) *Interferences*, which are abnormal contacts that may occur in either functional or

# Occlusal Prematurity

An occlusal contact which *interrupts the harmonious closure of the teeth along the centric relation arc*. The periodontium, masticatory muscles, and structures of the temporomandibular joint may be deleteriously affected when the importance of occlusal prematurities is magnified by parafunctional activity. Syn: Closing Interference.

# Occlusal Interference

An occlusal contact that *disrupts the smooth excursive movements* of teeth against each other. Most interferences cause a disclusion of the expected anterior guidance and *thus become the anterior determinant of mandibular movement*.

# Mutually Protected Articulation

An occlusal arrangement in which the posterior teeth contact in maximum intercuspation, but not in lateral or protrusive movements. The anterior teeth protect the posteriors during eccentric contacts. The posterior teeth protect the anterior teeth in MI. *Often, the cuspids are the only teeth contacting in lateral movement and the incisors the only teeth contacting in protrusive movement*. Syn: Anterior Protected Occlusion.

# Unilaterally Balanced Articulation

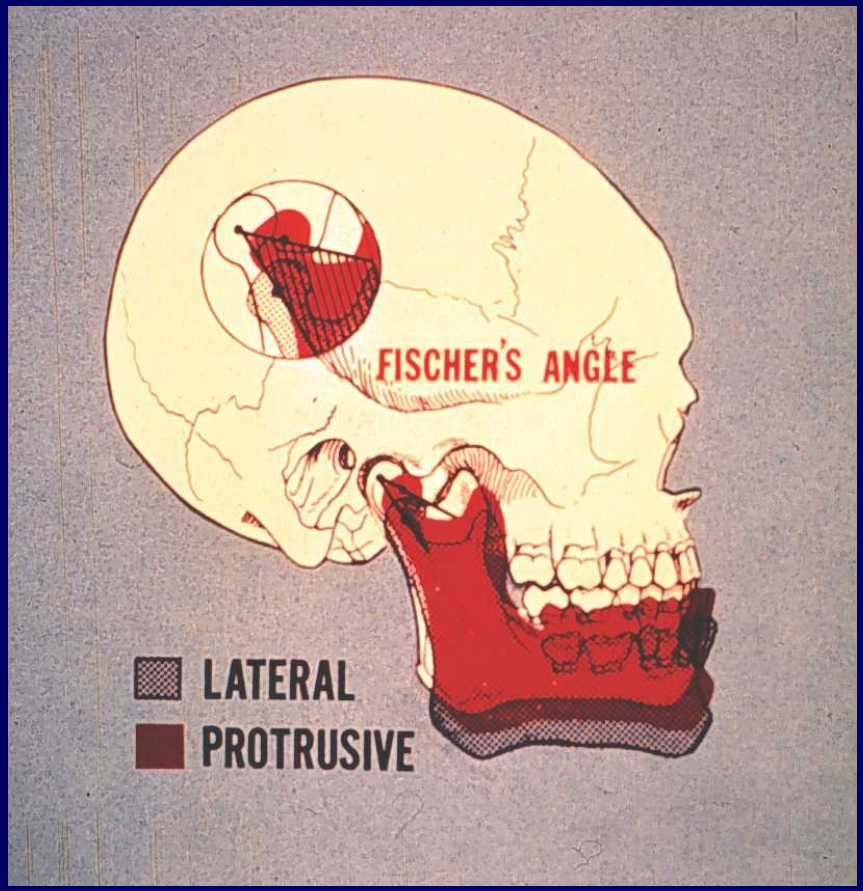
In lateral excursions, the posterior teeth on the working side contact as a group *simultaneously with contact on the anterior guidance*. The effect is to distribute lateral forces to multiple teeth rather than a single cuspid or other weakened anterior guiding teeth. The more teeth that bear the stress, the less stress any one tooth must bear. Group function with progressive disclusion is useful when anterior teeth are weak or non-functional. Syn:

# Balanced Articulation

*Principally a denture occlusion* in which there is group contact between posterior teeth simultaneously with contact on the anterior guidance in both working and balancing excursions. The intent of this occlusal scheme is to provide stability for denture bases in excursive movement. Bilateral balanced articulation is infrequently found in the natural dentition.

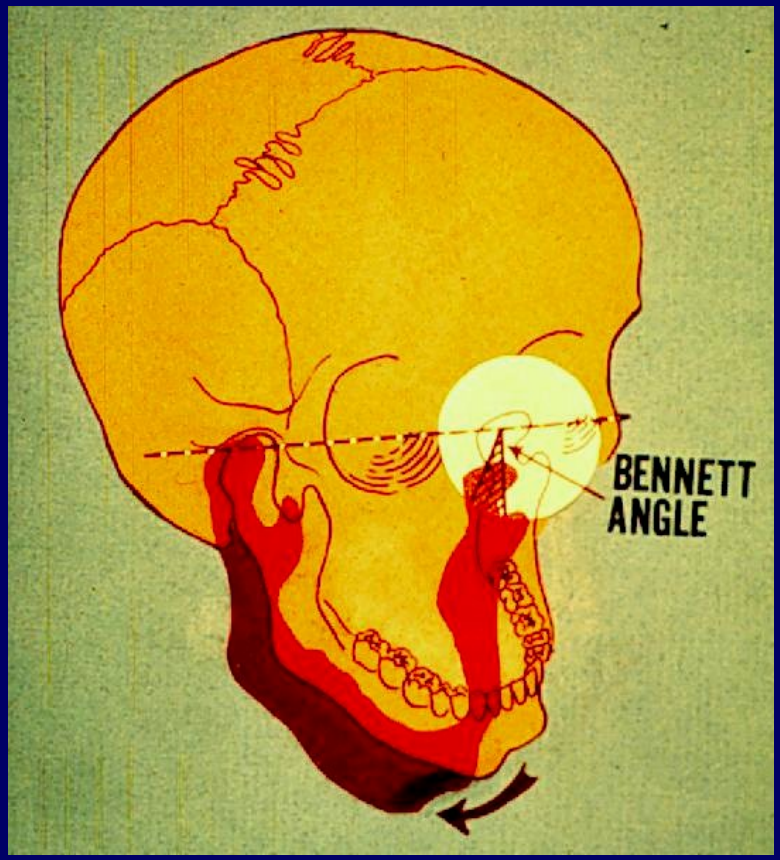
# Fisher Angle

The angle formed by the inclinations of the protrusive (orbiting) and nonworking side (rotating) condylar paths as *viewed in the sagittal plane*.



# Bennett Angle

The angle formed by the sagittal plane (assumed straight protrusive path) and the path of the advancing (orbiting) condyle during lateral mandibular movements as *viewed in the horizontal plane*.



# Occlusal Traumatism

Injury to the periodontium resulting from occlusal forces in excess of the reparative capacity of the attachment apparatus.

- **PRIMARY** - Pathologic periodontal tissue changes induced by occlusal forces in excess of normal masticatory function.

# Occlusal Traumatism

Injury to the periodontium resulting from occlusal forces in excess of the reparative capacity of the attachment apparatus.

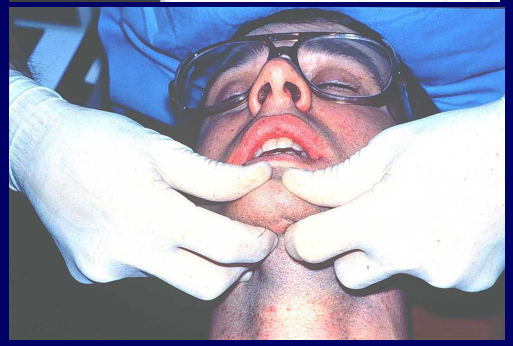
- **SECONDARY** - Pathologic periodontal tissue changes induced by occlusal forces produced by normal masticatory function on teeth with decreased attachment

# Christensen’s Phenomenon

The creation of a space between the posterior teeth bilaterally *during protrusion or on the balancing side during lateral excursions*. Protrusive and laterotrusive interocclusal records register the gap produced by Christensen's Phenomenon. *The gap is caused by the incline of the temporal eminence*.

# Techniques for Recording Centric Relation

- *Anterior Deprogrammers* (Lucia jig, Leaf gauge)
- *Self-guided*
- *Central Bearing Devices* (Intra/Extra-oral devices), i.e., Coble tracer
- *Chin point/One-handed techniques*
- *Bilateral Manipulation* (Dawson Technique)



# Determinants of mandibular movement and morphology

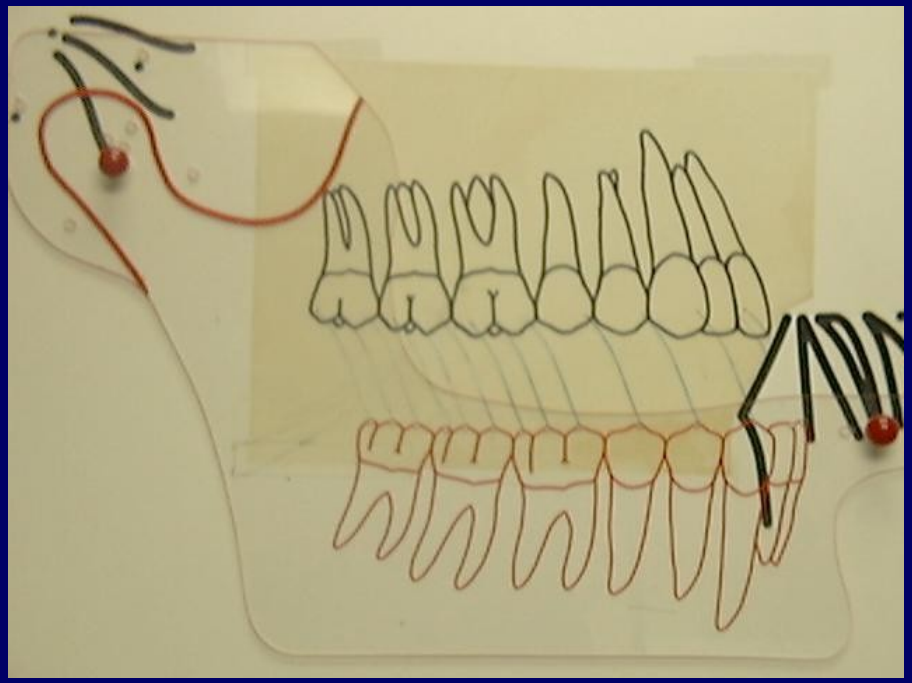
Vertical Determinants - **influence the heights of cusps:**

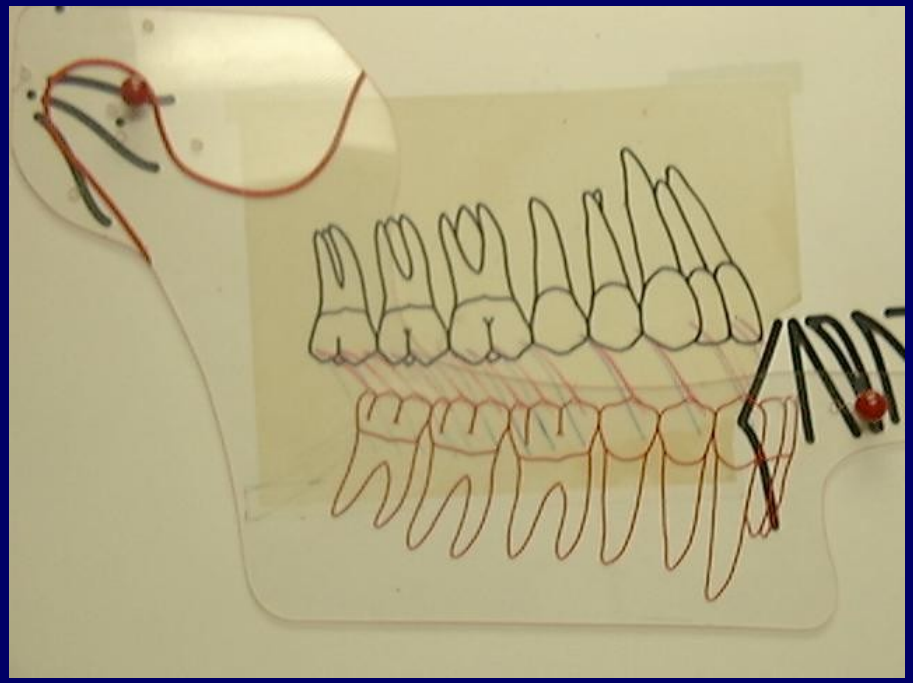
- Condylar Guidance
- Anterior Guidance
- Plane of Occlusion
- Curve of Spee
- Mandibular Lateral Translation - *amount, direction & timing*

# Determinants of mandibular movement and morphology

*Vertical Determinants*

- ***Condylar Guidance***- *The steeper the condylar guidance, the taller the posterior cusps.*

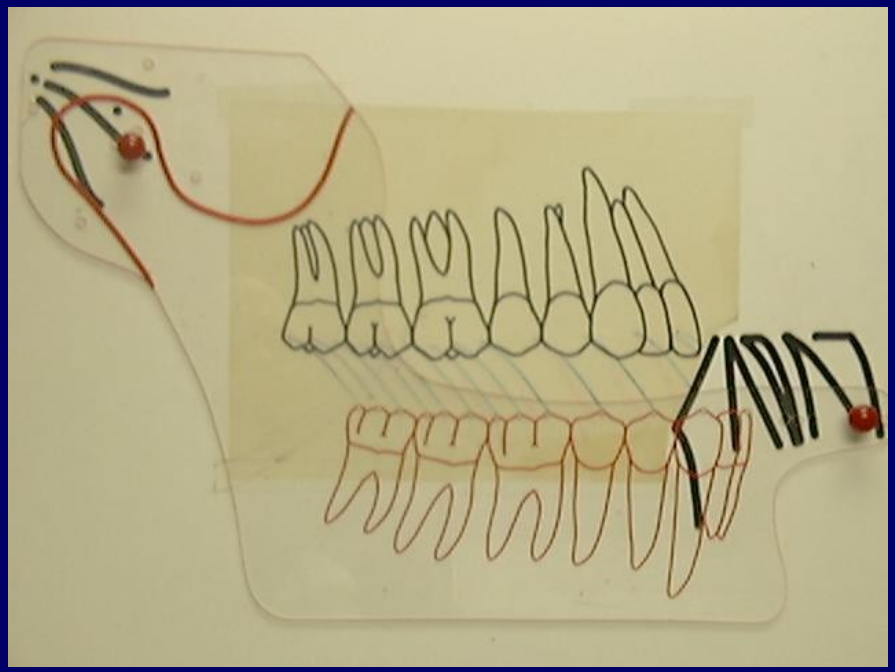


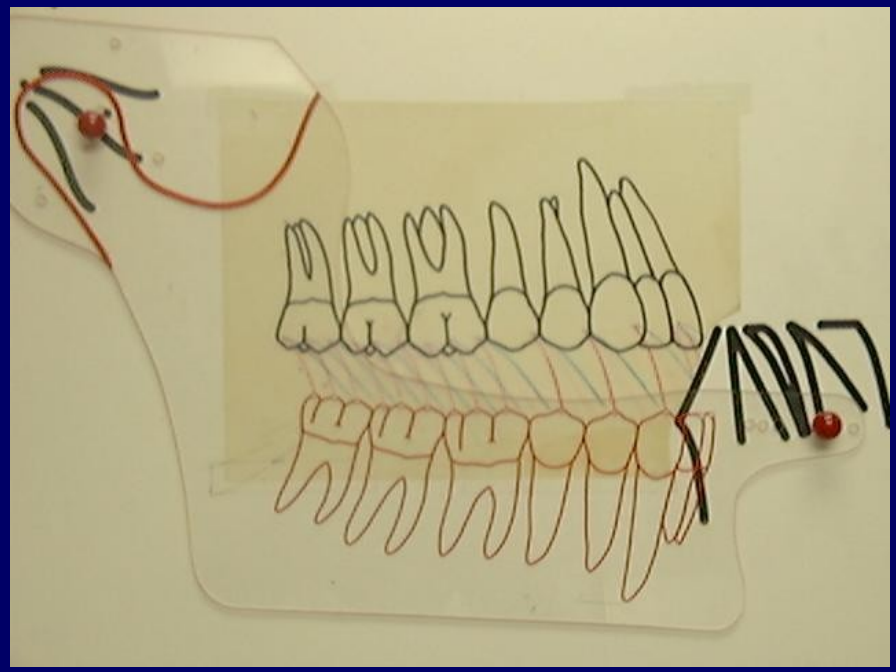


# Determinants of mandibular movement and morphology

*Vertical Determinants*

- ***Anterior Guidance-*** *The greater the vertical overlap, the taller the posterior cusps.*

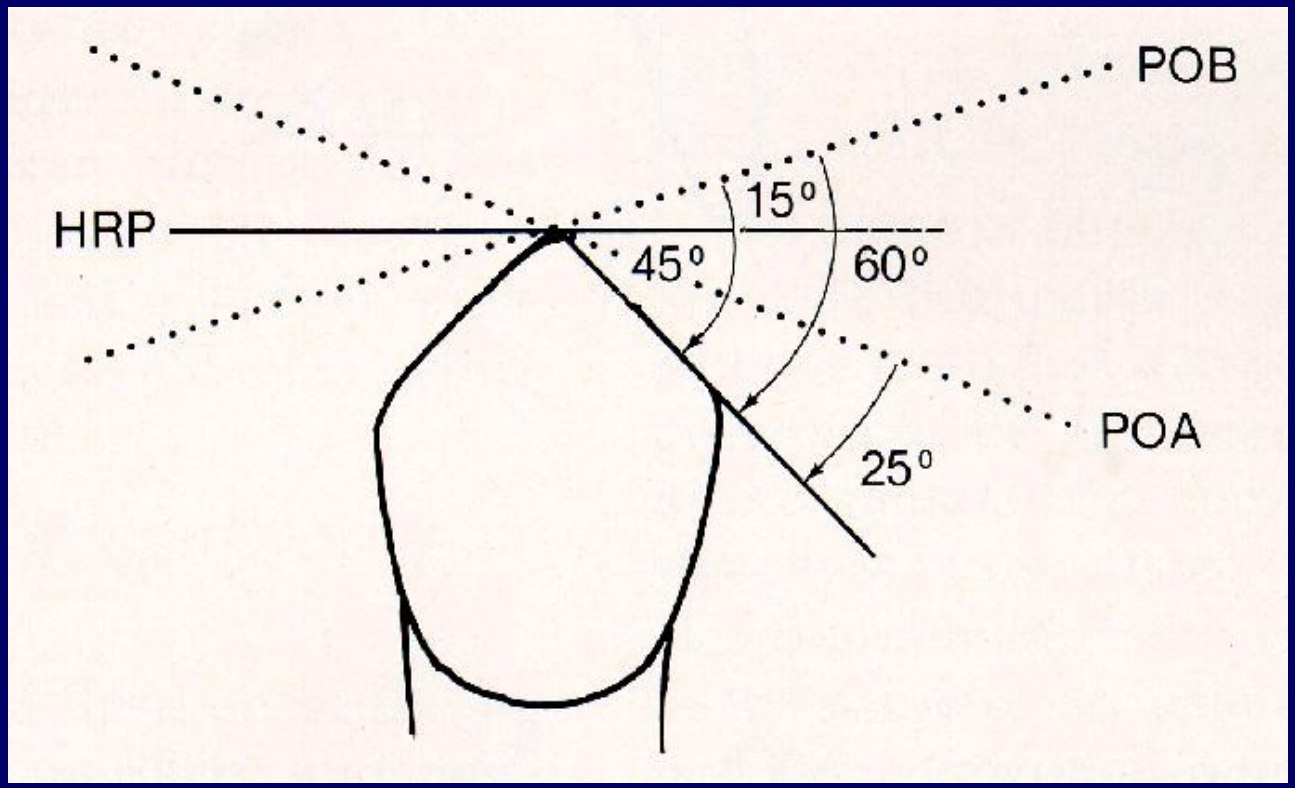




# Determinants of mandibular movement and morphology

*Vertical Determinants*

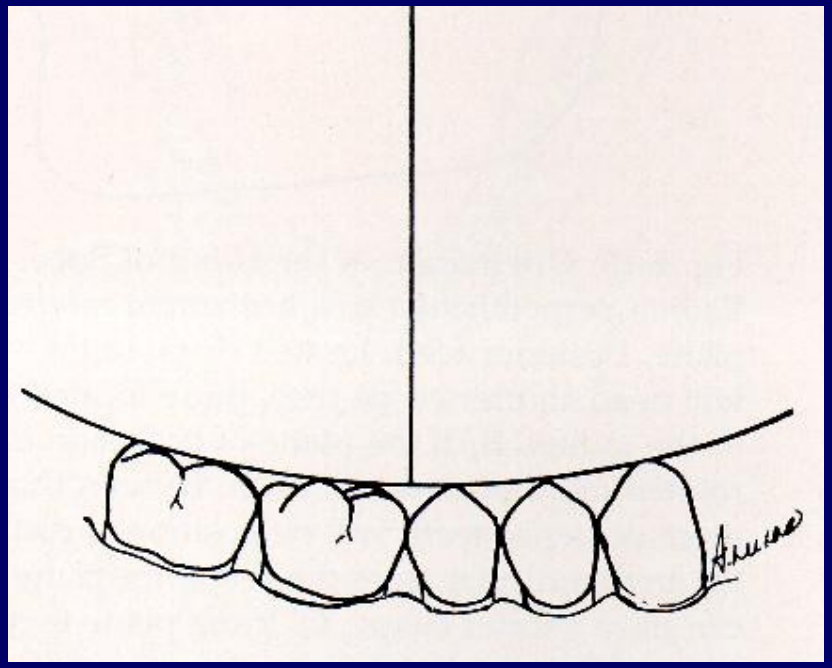
- ***Plane of Occlusion***- *The more parallel the plane of occlusion to the condylar guidance, the shorter the posterior cusps.*

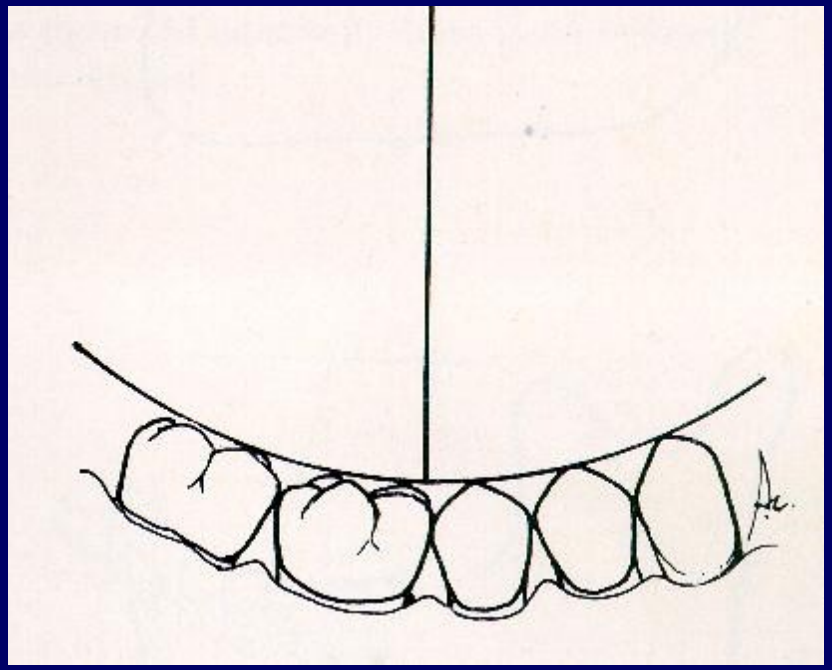


# Determinants of mandibular movement and morphology

*Vertical Determinants*

- ***Curve of Spee***- *The more acute the Curve of Spee, the shorter the most posterior cusps.*

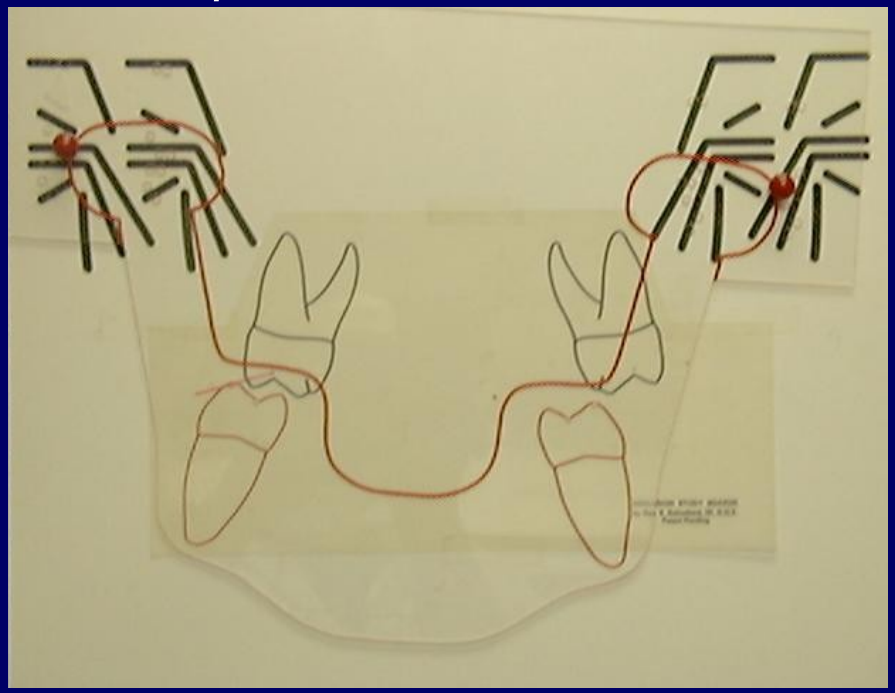


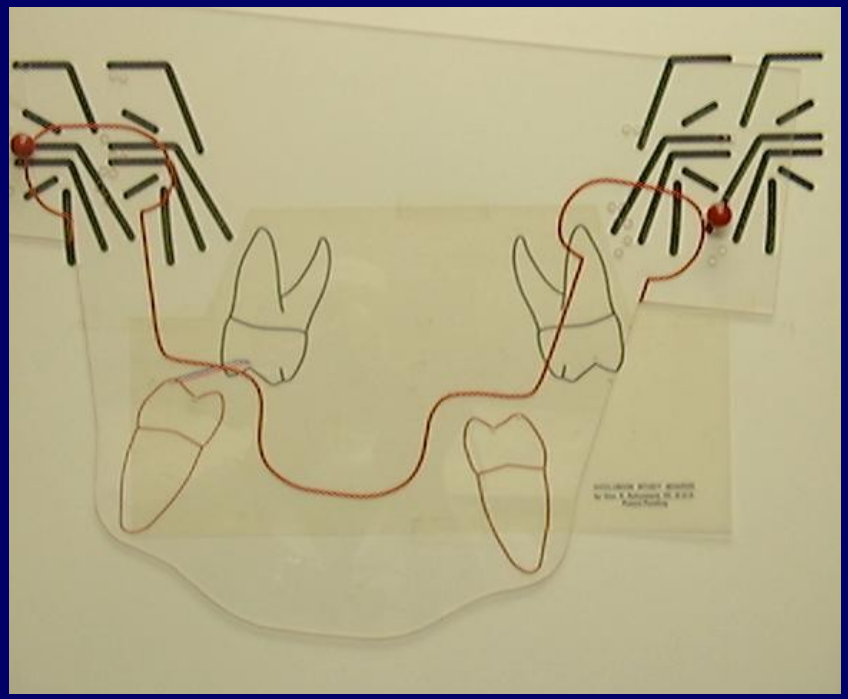


# Determinants of mandibular movement and morphology

*Vertical Determinants*

- ***Mandibular Lateral Translation*** **- *amount***
- *The greater the movement, the shorter the posterior cusps…*





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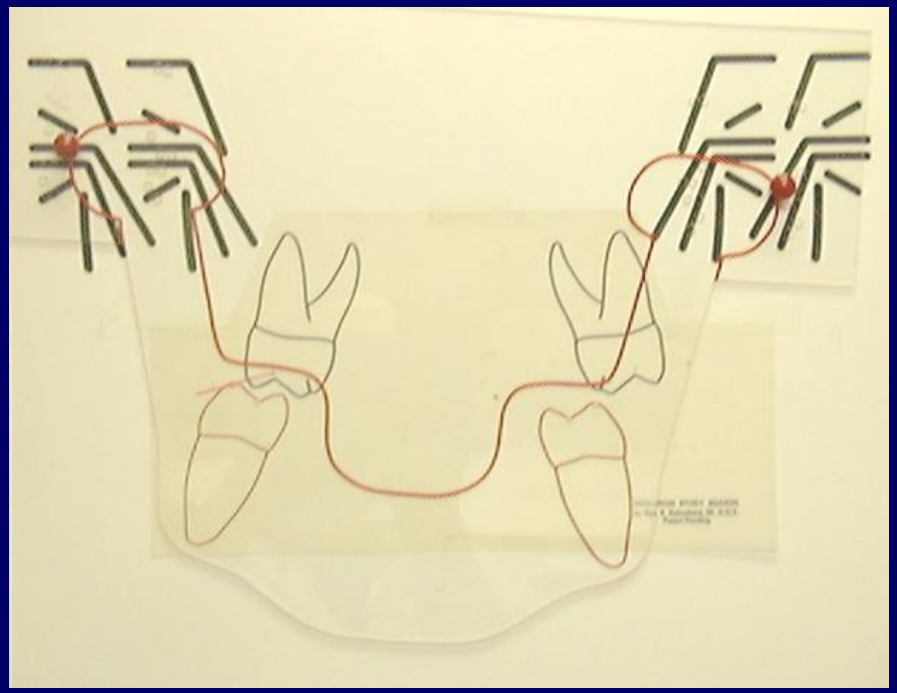
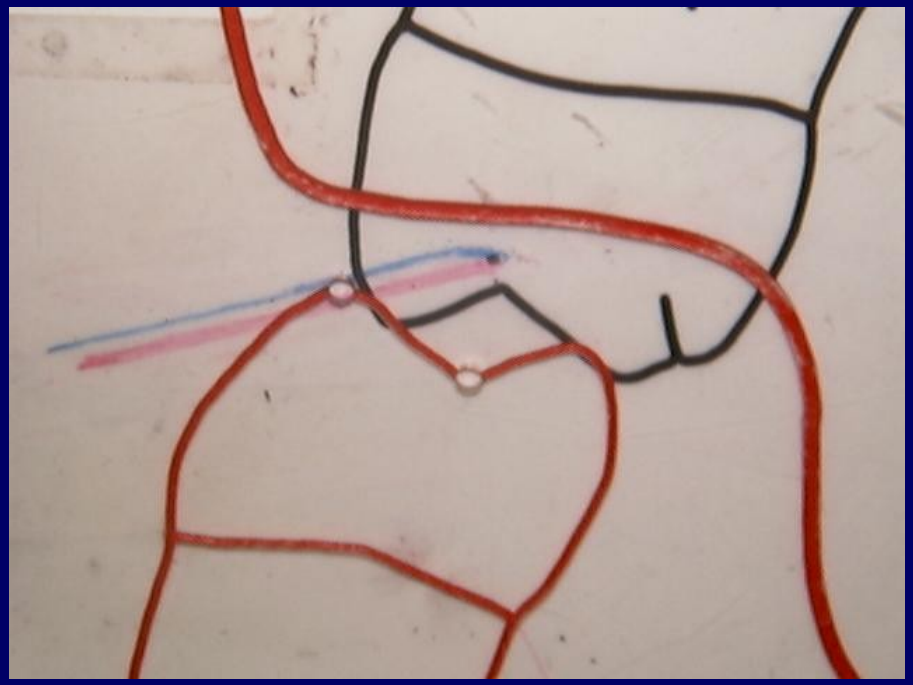
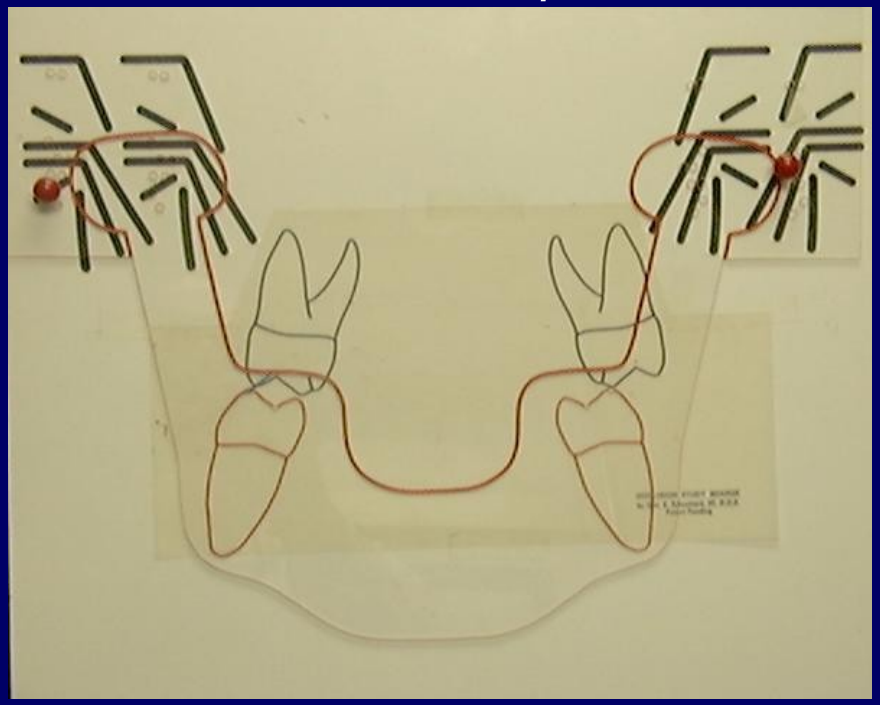


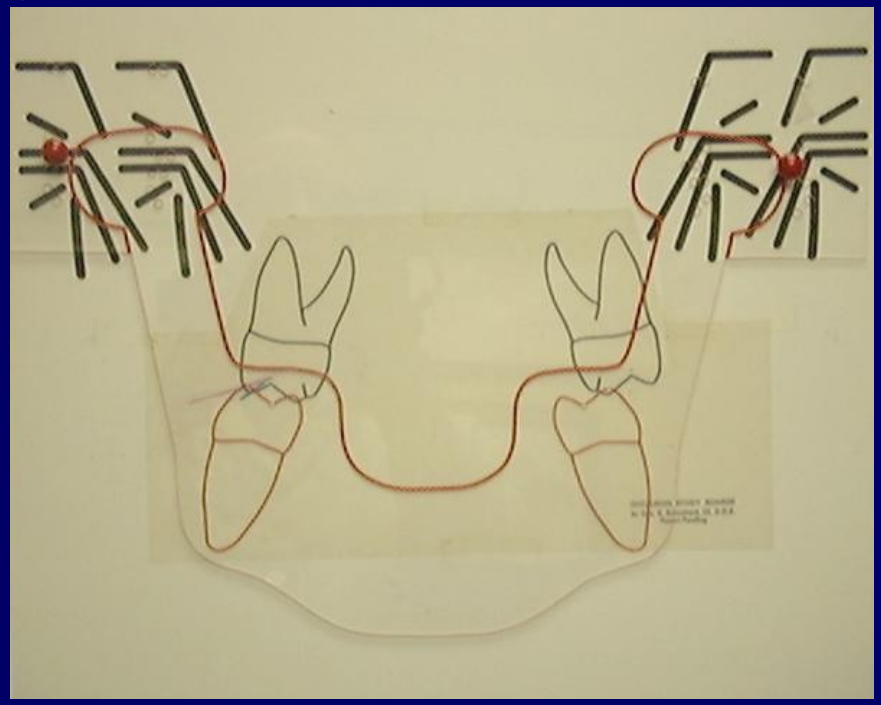


# Determinants of mandibular movement and morphology

*Vertical Determinants*

- ***Mandibular Lateral Translation*** - ***direction***
- *The more superior the movement of the rotating condyle, the shorter the posterior cusps…*





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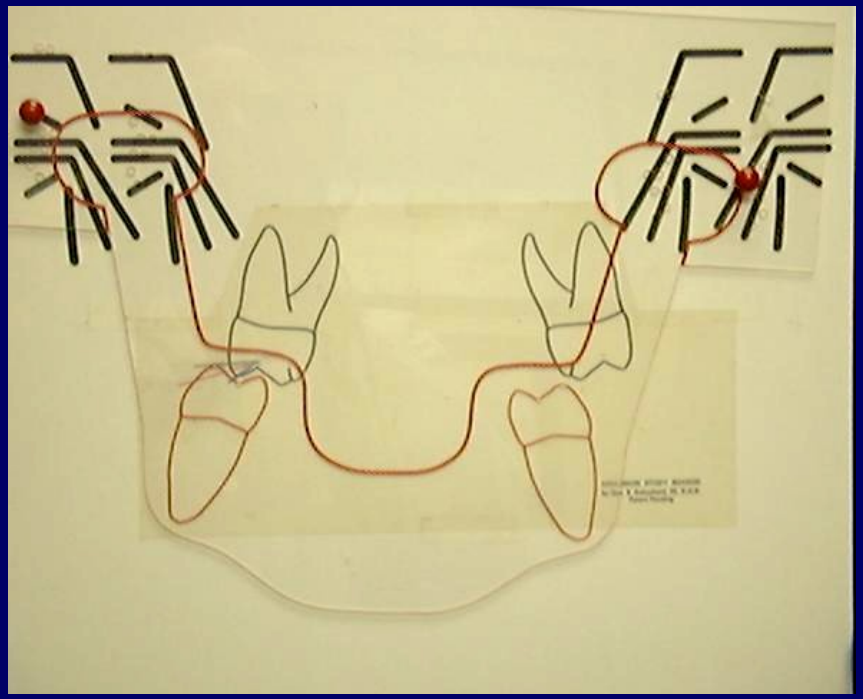
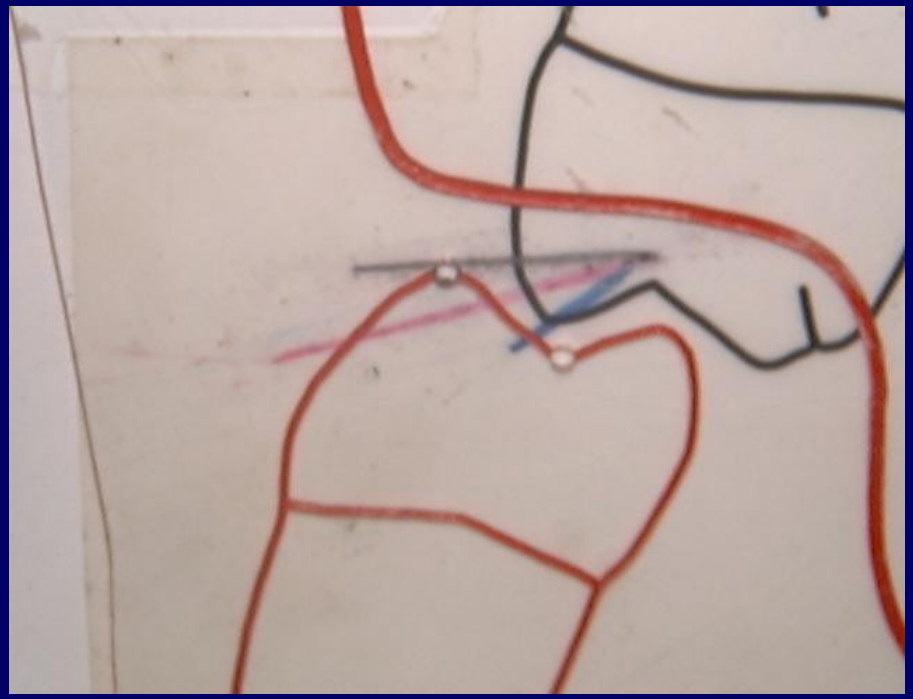
*Vertical Determinants*

- ***Mandibular Lateral Translation*** - ***direction***
- *The more superior the movement of the rotating condyle, the shorter the posterior cusps.*

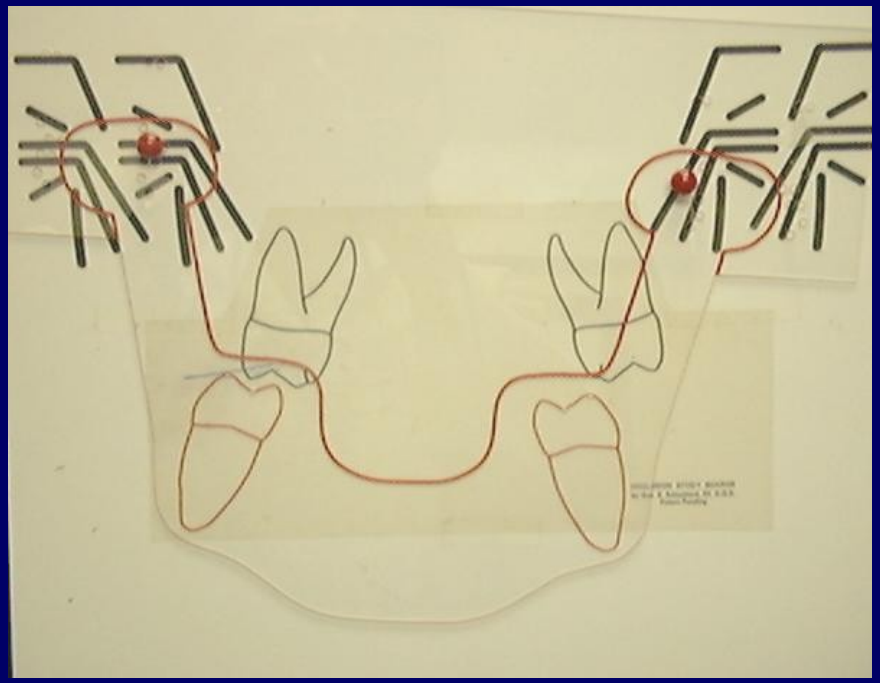


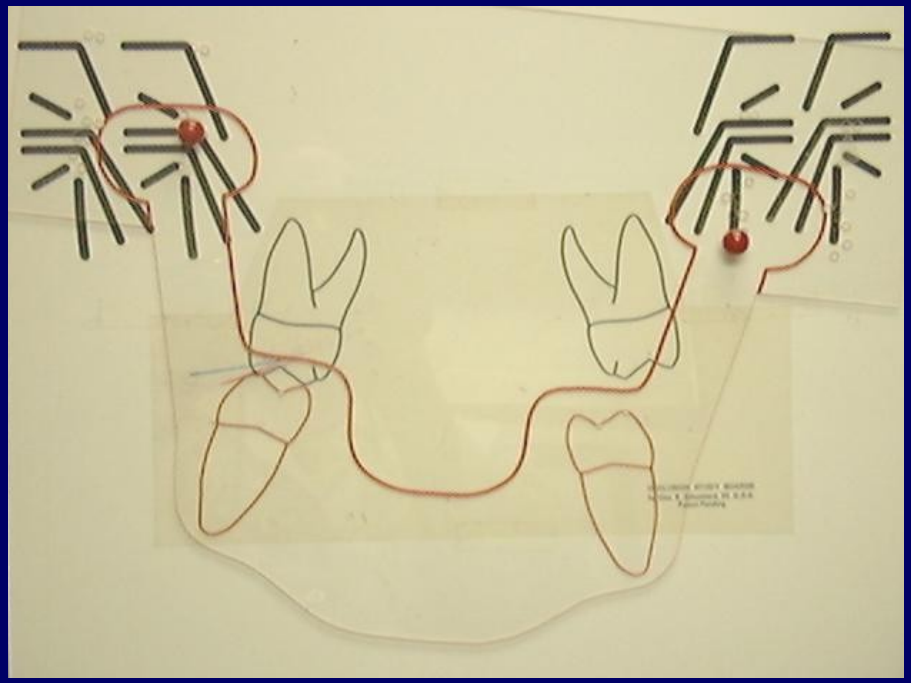


# Determinants of mandibular movement and morphology

*Vertical Determinants*

- ***Mandibular Lateral Translation*** **- *timing***
- *The greater the immediate sideshift, the shorter the posteri[illegible]sps...*

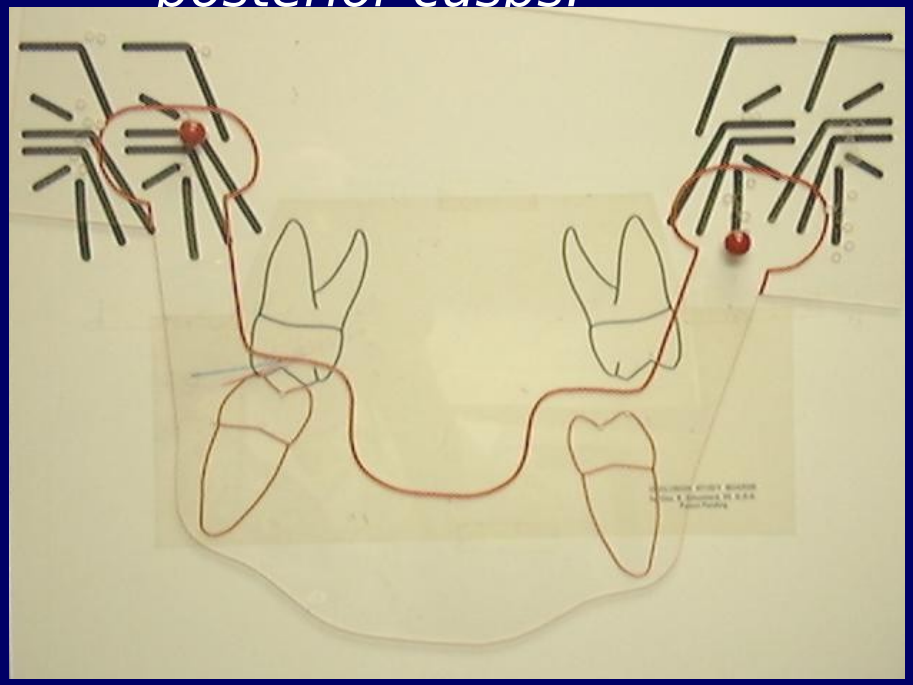


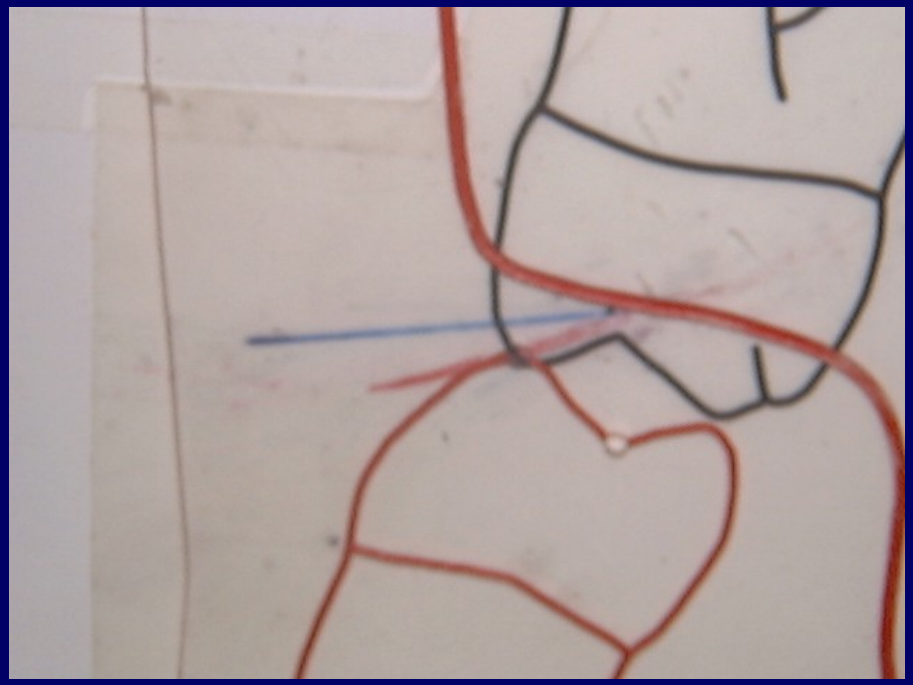


# Determinants of mandibular movement and morphology

*Vertical Determinants*

- ***Mandibular Lateral Translation*** **- *timing***
- *The greater the immediate sideshift, the shorter the posterior cusps.*





# Determinants of mandibular movement and morphology

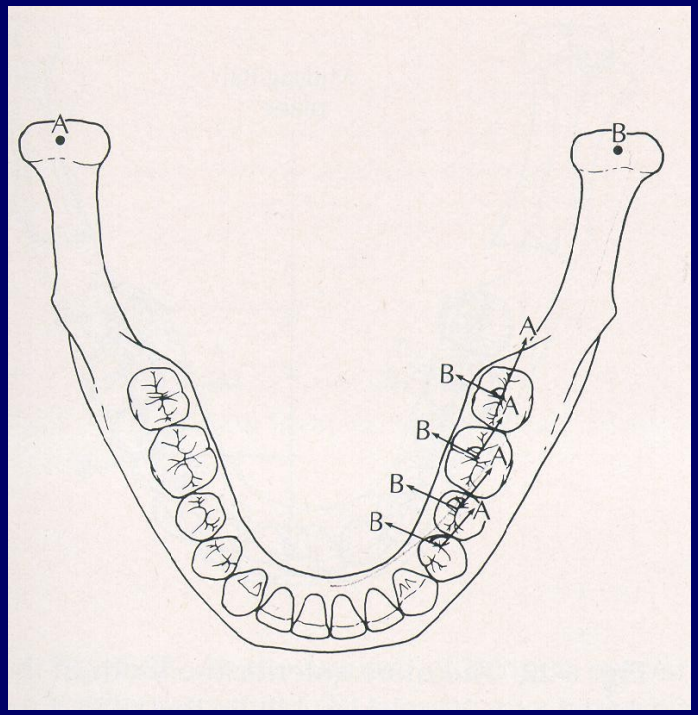
Horizontal Determinants - **relationships that effect the direction of ridges and grooves on the occlusal surface.**

- Distance from Rotating Condyle
- Distance from Mid-Sagittal Plane
- Distance from Rotating Condyle and Mid-Sagittal Plane
- Mandibular Lateral Translation- amount, direction & timing
- Intercondylar Distance

# Determinants of mandibular movement and morphology

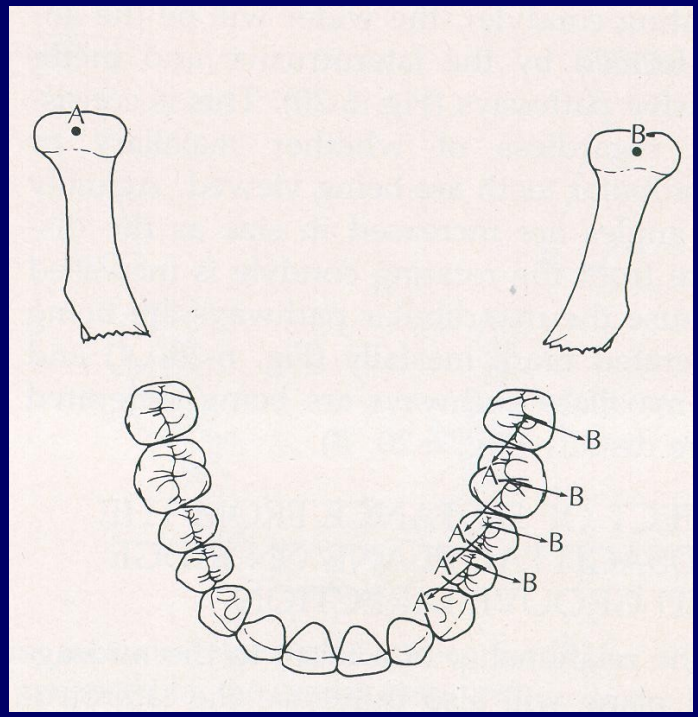
*Horizontal Determinants*

- ***Distance from Rotating Condyle-*** *The greater the distance from the rotating condyle, the wider the angle between laterotrusive and mediotrusive pathways.*




A=path when A is rotating condyle

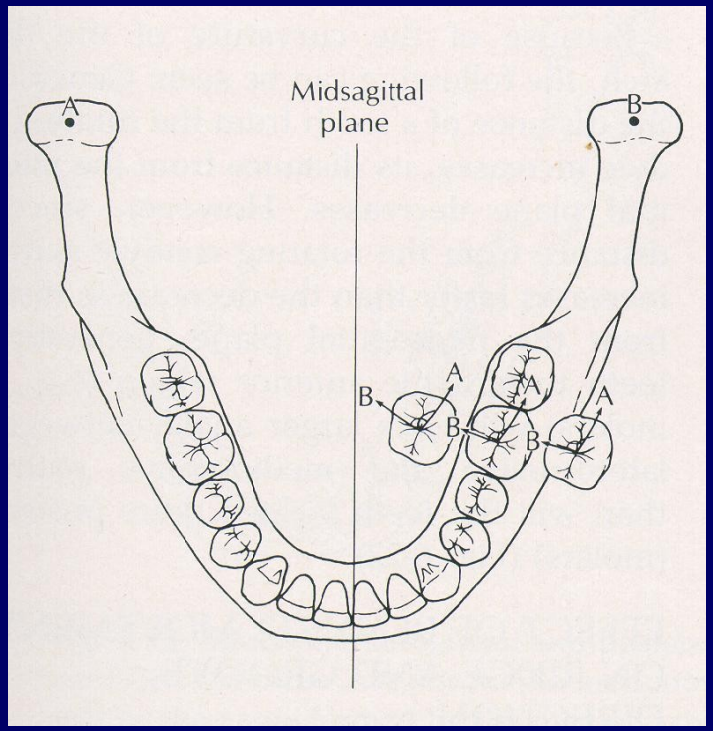
B=path when B is rotating condyle



# Determinants of mandibular movement and morphology

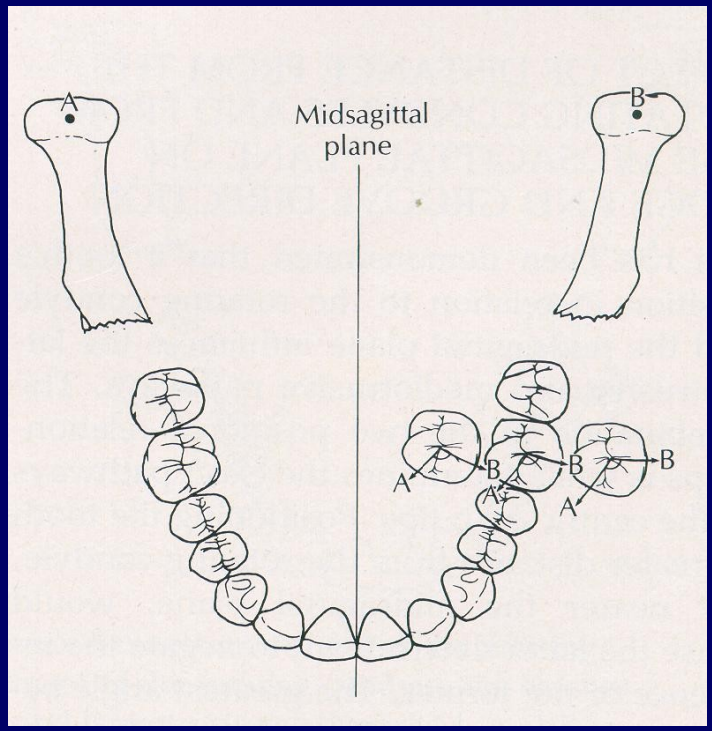
*Horizontal Determinants*

- ***Distance from Mid-Sagittal Plane-*** *The greater the distance from the mid-sagittal plane, the wider the angle between laterotrusive and mediotrusive pathways.*




A=path when A is rotating condyle

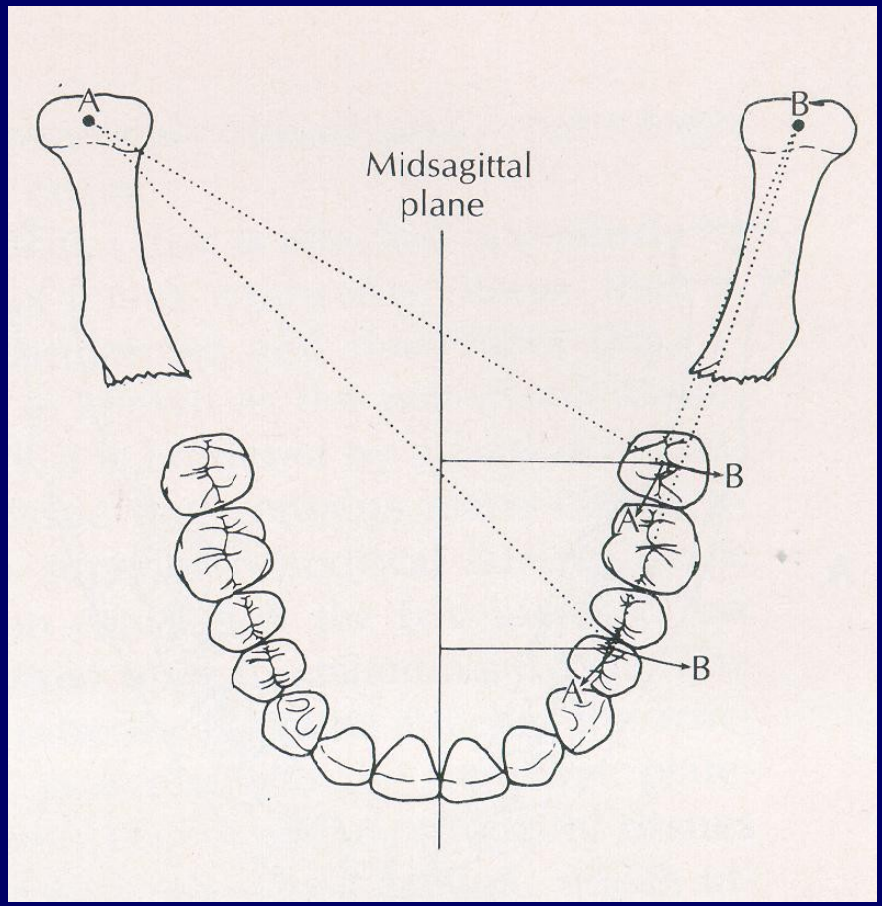
B=path when B is rotating condyle



# Determinants of mandibular movement and morphology

*Horizontal Determinants*

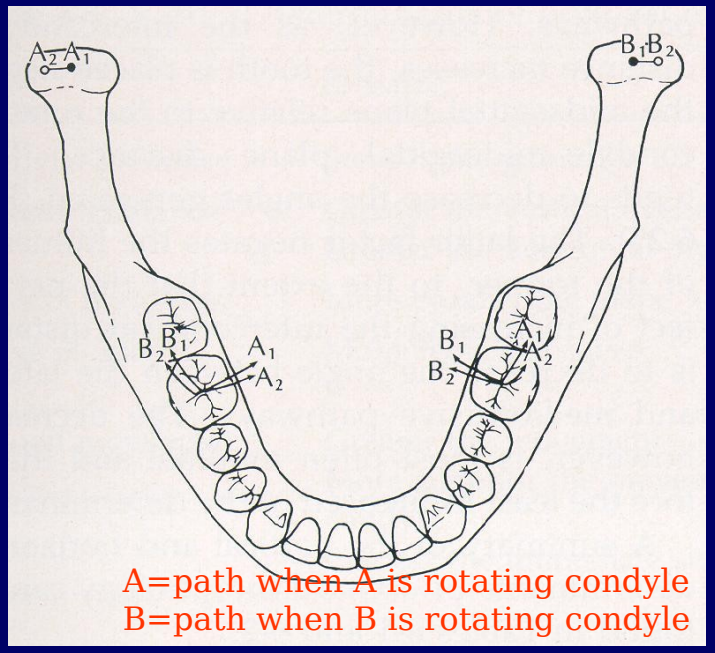
- ***Distance from Rotating Condyle and Mid-Sagittal Plane***- *Generally, as distance from the rotating condyle increases, distance from the midsagittal plane decreases. The increase is usually greater than the decrease, so distance from the rotating condyle overrides and larger angles are seen in the*

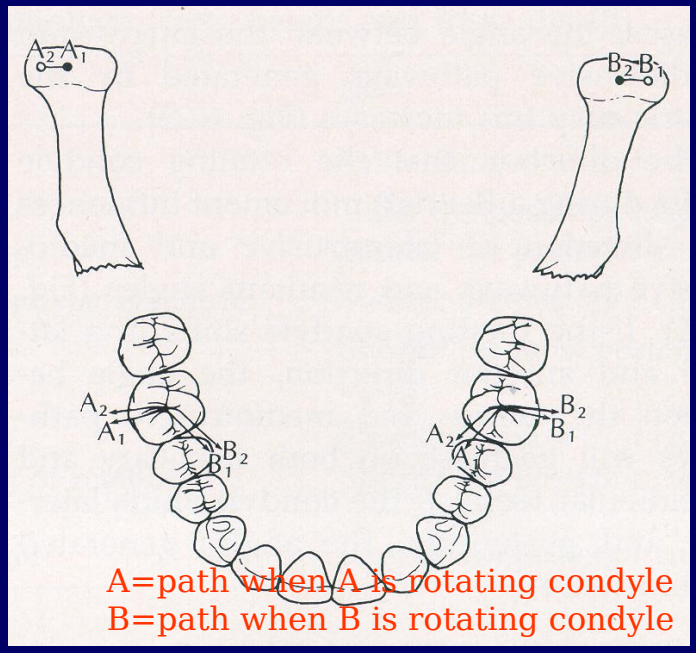


# Determinants of mandibular movement and morphology

*Horizontal Determinants*

- ***Mandibular Lateral Translation- amount***
- *The greater the movement, the wider the angle between laterotrusive and mediotrusive pathways.*

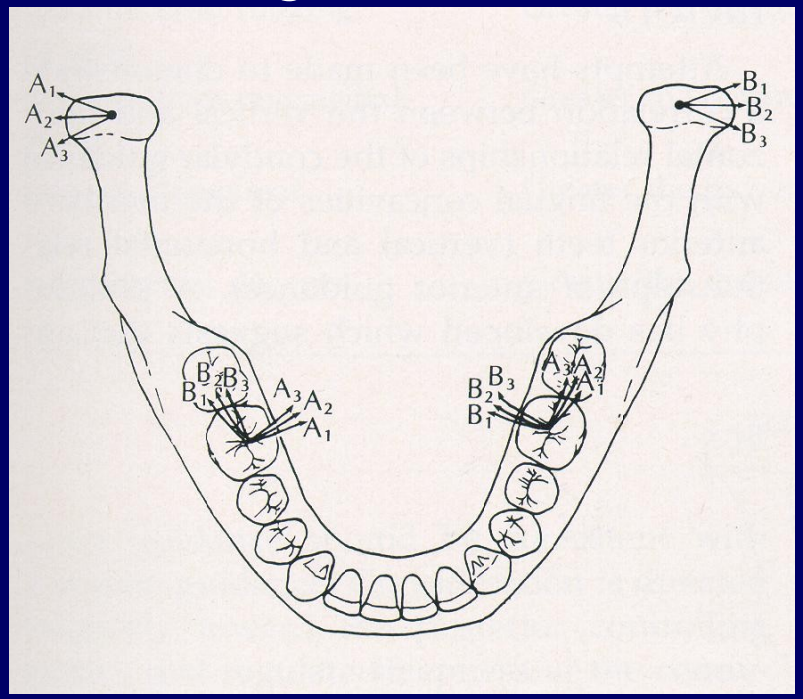


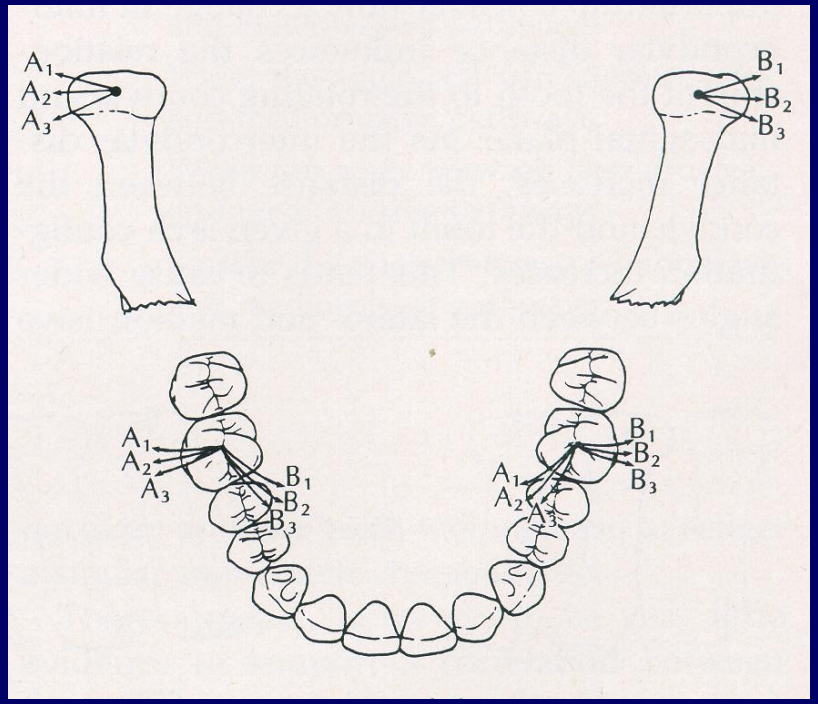



# Determinants of mandibular movement and morphology

*Horizontal Determinants* -

- ***Mandibular Lateral Translation-*** ***direction***
- *The more distal the shift of the rotating condyle, the wider the angle between the laterotrusive and mediotrusive*



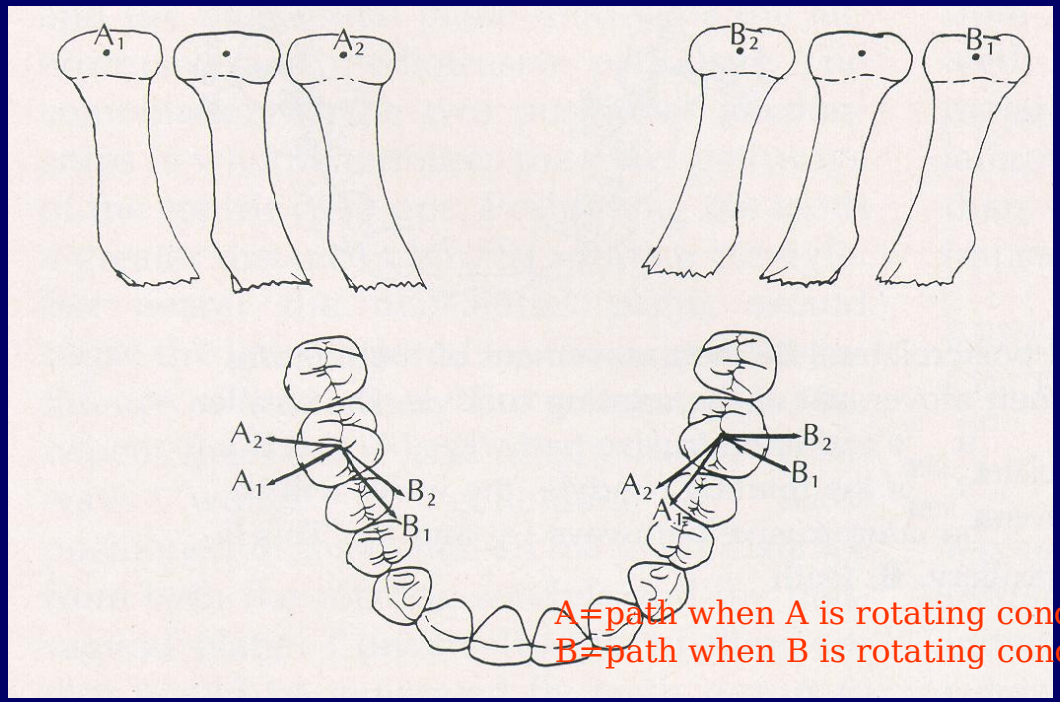




A=path when A is rotating condyle

# Determinants of mandibular movement and morphology

*Horizontal Determinants*

- ***Intercondylar Distance-*** *The greater the intercondylar distance, the smaller the angle between the laterotrusive and mediotrusive pathways.*



# Determinants of mandibular movement and morphology

**Table 6-1.** Vertical determinants of occlusal morphology (cusp height and fossa depth)

| *Factor* | *Condition* | *Effect* |
|---|---|---|
| Condylar guidance | Steeper the guidance | Taller the posterior cusps |
| Anterior guidance | Greater the vertical overlap | Taller the posterior cusps |
| | Greater the horizontal overlap | Shorter the posterior cusps |
| Plane of occlusion | More parallel the plane to condylar guidance | Shorter the posterior cusps |
| Curve of Spee | More acute the curve | Shorter the most posterior cusps |
| Bennett movement | Greater the movement | Shorter the posterior cusps |
| | More superior the movement of rotating condyle | Shorter the posterior cusps |
| | Greater the immediate sideshift | Shorter the posterior cusps |

# Determinants of mandibular movement and morphology

**Table 6-2.** Horizontal determinants of occlusal morphology (ridge and groove direction)

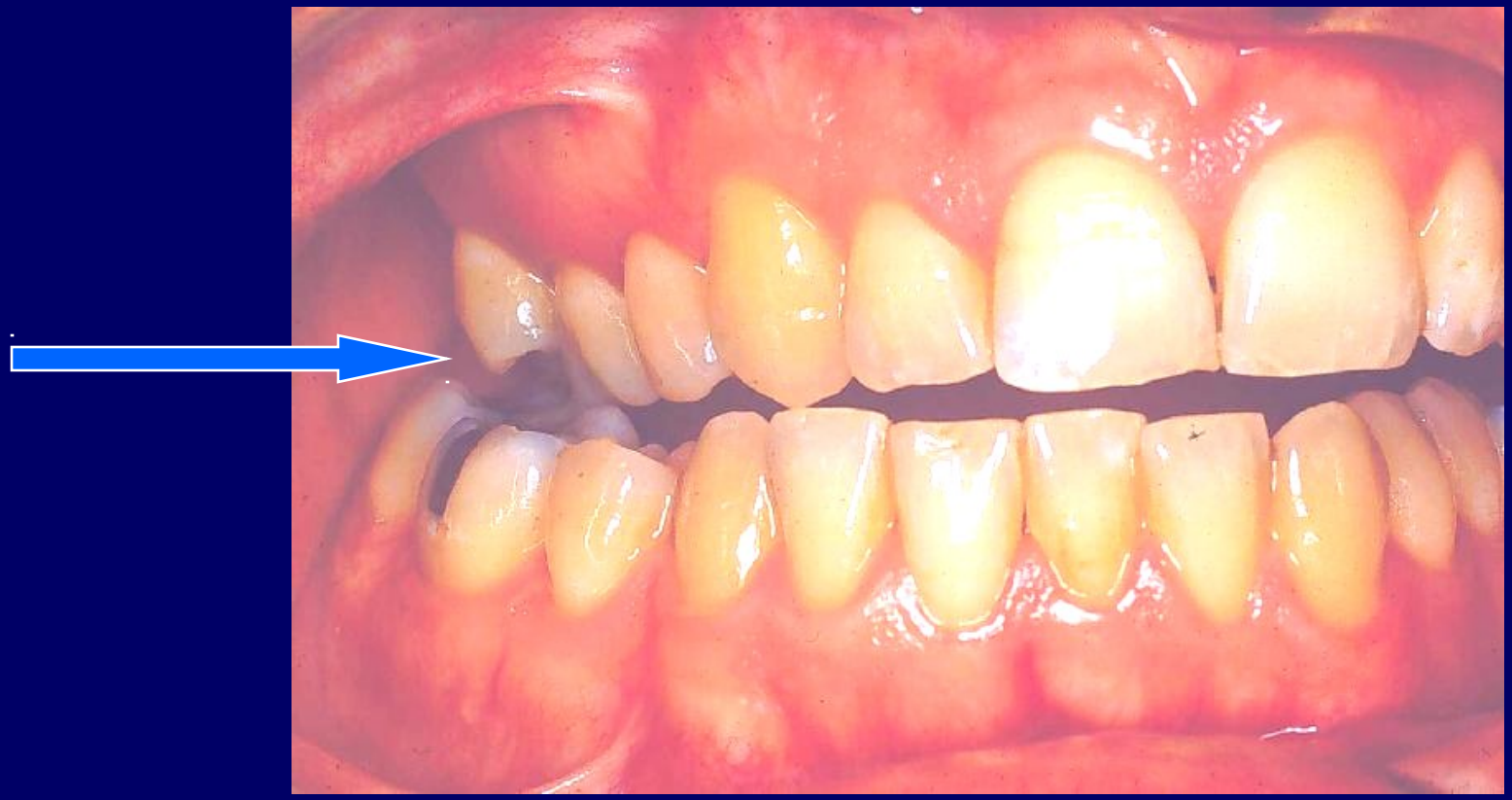
| *Factor* | *Condition* | *Effect* |
|---|---|---|
| Distance from rotating condyle | Greater the distance | Wider the angle between laterotrusive and mediotrusive pathways |
| Distance from midsagittal plane | Greater the distance | Wider the angle between laterotrusive and mediotrusive pathways |
| Bennett movement | Greater the movement | Wider the angle between laterotrusive and mediotrusive pathways |
| Intercondylar distance | Greater the distance | Smaller the angle between laterotrusive and mediotrusive pathways |

# Occlusal Interferences

Centric occlusal interferences (occlusal prematurity)

# Occlusal Interferences

Working occlusal interferences (laterotrusive interference)



# Occlusal Interferences

Non-working occlusal interferences (mediotrusive interference)

# Occlusal Interferences

Protrusive occlusal interference

# Occlusal Interferences

Lateral protrusive interference (lateral maxillary incisor against its opponent in lateral protrusive movements).

# Occlusal Interferences

Crossover interference (interference between posterior teeth when the mandible has translated laterally beyond the guidance of the cuspids).

# Occlusal Traumatism

Most literature supports the fact that, in the presence of excessive occlusal forces, there is alveolar bone resorption leading to an increase in tooth mobility and an increased width of the periodontal ligament space with cementum and collagen resorption. If this takes place in the *absence of infection*, it *should be reversible*, and *no attachment loss should occur*. We have only very shaky evidence to show definitively that we get formation of angular defects secondary to occlusal traumatism alone.

# Occlusal Traumatism

Most clinical and animal studies show no permanent attachment loss due to occlusal traumatism with a healthy periodontium. Exception: if the alveolar plate is thin, permanent loss of attachment will be observed.

*Glickman's Theory of Co-destruction* says that occlusal trauma hastens periodontal destruction by permitting inflammatory cells to spread more rapidly to the PDL. This is controversial.

Gher ME. *Changing concepts. The effects of occlusion on periodontitis.* Dent Clin North Am 1998 Apr;42(2):285-99

# Articulators

Hobo, S, Shillingburg, H and Whitsett, L. *Articulator selection for restorative dentistry.* J Prosthetic Dent 1976; 36(1):36-43.

**FSBGD Review -Articulator Selection Handout**
LCDR C. R. Fahncke, DC, USN

# TMD

Carlson CR, et. al. *Psychological and physiological parameters of masticatory muscle pain.* Pain (1998); 76: 297-307.